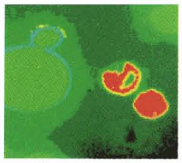


Skin Damage Assessment by Ultrasonic Waves

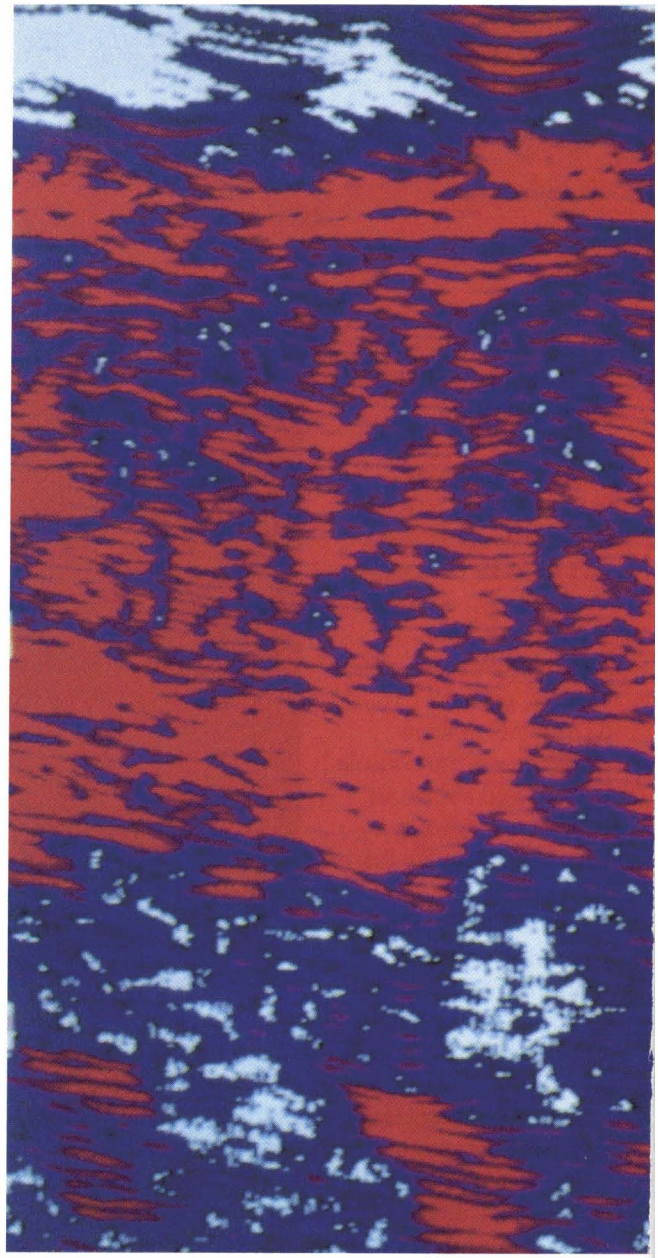
Heading spinoffs in health and medicine is an instrument for improved diagnosis and treatment of burns and skin disorders

Each year about two million Americans suffer serious burns. A large number of them require hospital treatment and 10-12,000 die from their injuries. Among those hospitalized, some 70,000 receive intensive care and the cost of such treatment runs to several hundred million dollars a year.

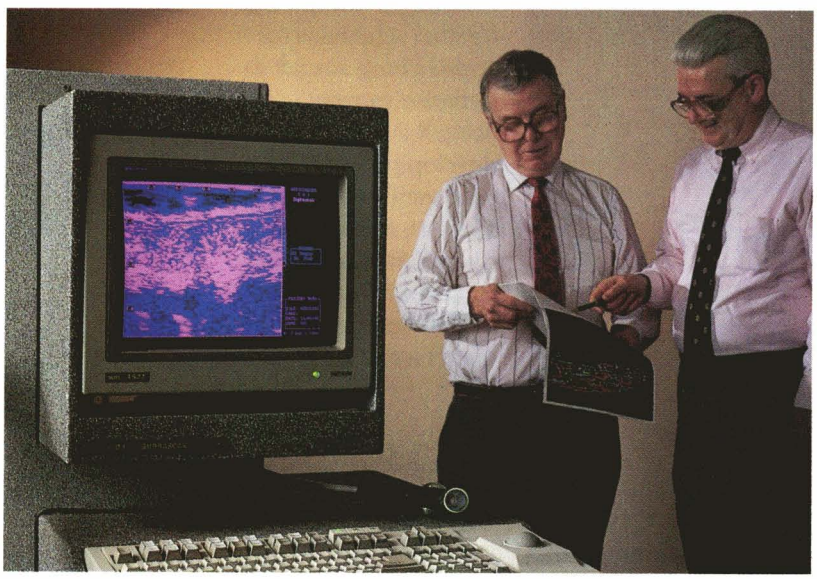
The application of NASA ultrasound technology, originally developed as a means of detecting microscopic flaws in aircraft and spacecraft materials, has provided an advanced diagnostic instrument that makes possible immediate assessment of burn damage, knowledge that permits improved patient treatment and may even save lives in serious burn cases.

Developed by Westminster Supra Scanner, Inc. (WSS), Orangeburg, New York, and produced under NASA license, the Supra Scanner is the first clinically-tested, commercially available ultrasound system that permits quantitative assessment of burn depth.

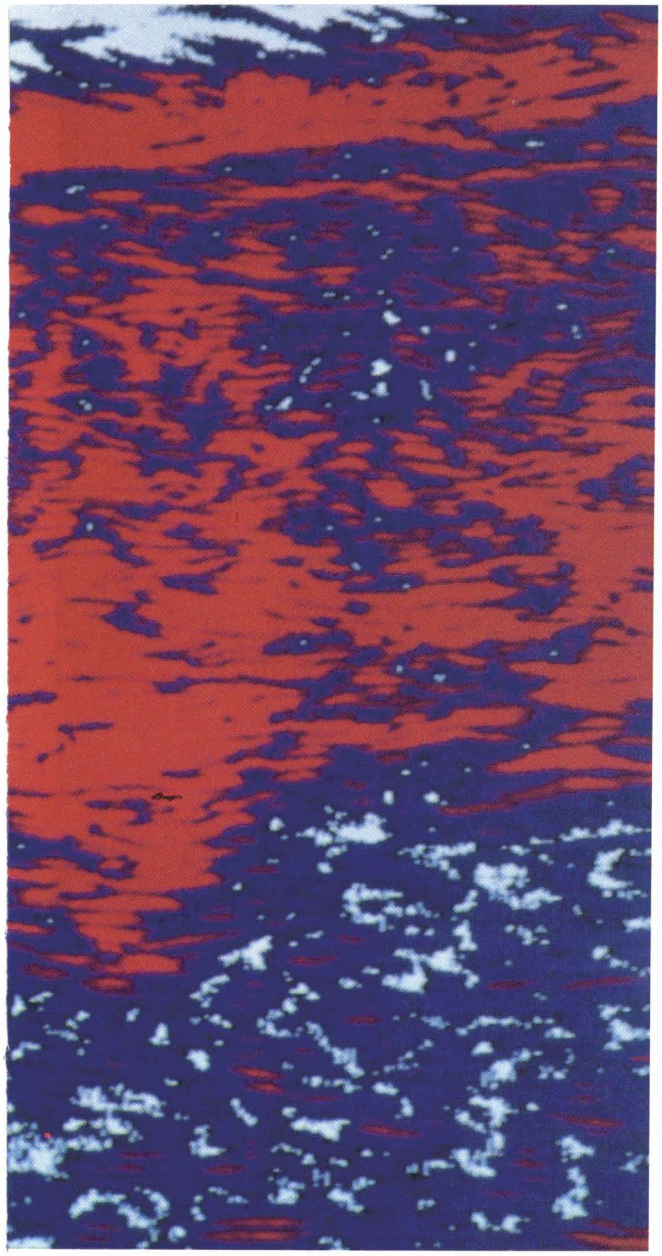
The depth of the burn is the critical factor in burn diagnosis and treatment of second and third degree burns. The customary treatment is to allow natural sloughing of burn-caused necrotic or dead tissue and closing the resulting wounds with skin grafts. Effective treatment, therefore, is dependent upon early recognition of the *extent* of dead tissue and its removal, by chemical or surgical means, to minimize risk of infection and hasten healing. The key is accurate information on the depth of the burn. Earlier methods were subjective and thus prone to error.



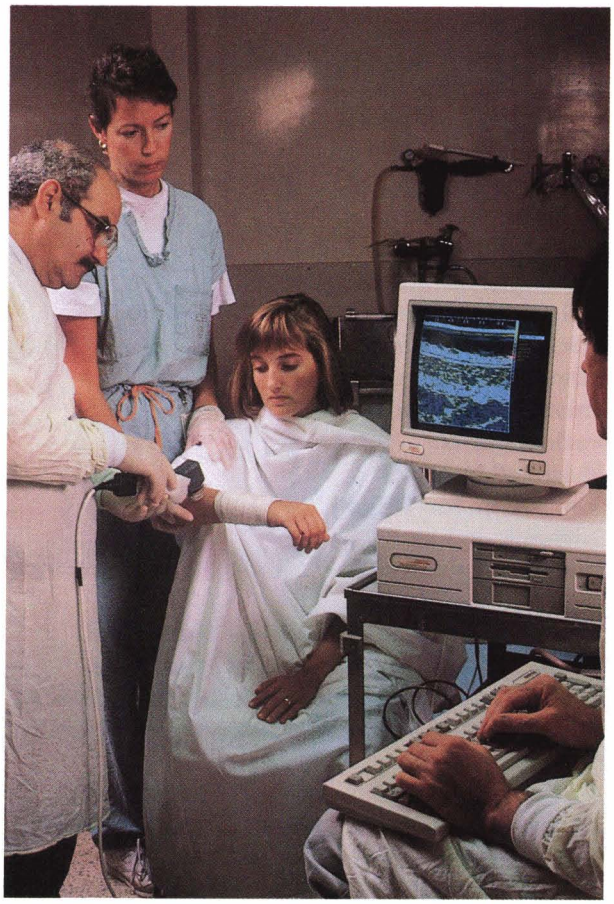
Shown below is the Westminster Supra Scanner, an instrument for measuring burn depth, a key factor in diagnosis and treatment of burns. The system includes the keyboard and display console at left and the ultrasonic scanner held by Westminster chairman Jack Cantwell. At right is William Gregory, president of Westminster Technology Group, Inc.



To meet the need for precise determination of burn depth, Langley Research Center initiated — in 1983 — an applications engineering project (an instrument of NASA's Technology Utilization Program, an applications engineering effort is one involving use of NASA expertise to redesign and reengineer existing aerospace technology for the solution of national problems). The Langley project was spearheaded by Dr. John H. Cantrell and Dr. William T. Yost, both physicists with Langley's Nondestructive Measurement Science Branch, which conducts research on ultrasonic and other techniques for evaluating quality and fatigue of aerospace materials.



A typical false-color image created by the Westminster Supra Scanner. To the skilled eye, it provides information on skin surface and subsurface features that can be applied not only to burn diagnosis but to other skin disorders.



Dr. Anthony Marmarou of the Medical College of Virginia (MCV) uses the Supra Scanner to measure the depth of a patient's burn. MCV conducted clinical evaluations on both the NASA prototype and the commercial instrument.

Other organizations cooperating on the project include the Medical College of Virginia (MCV), Richmond, Virginia; the University of Aberdeen, Scotland; and the NASA Technology Applications Team, Research Triangle Institute (RTI), North Carolina, which coordinated the project and directed the commercialization of the technology.

Langley developed a prototype instrument capable of determining the level where burned tissue ends and healthy tissue begins. It is possible to do so because of the fact that, when skin is burned, the protein collagen that makes up some 40 percent of skin becomes more dense. The Langley technique involved directing ultrasonic waves at the burned area; the difference in density between damaged and healthy tissue causes sound waves to reflect at the point of interface.

After successful completion of preliminary clinical tests by MCV on patients with different types and different degrees of burn, NASA's RTI technology team negotiated an agreement — in 1990 — with Jack Cantwell, Inc. (now WSS) for commercialization of the technology. Following additional clinical tests of the commercial version by MCV and the University of Aberdeen, the Supra Scanner was granted Food and Drug Administration approval in December 1990.

The Supra Scanner uses the NASA depth measurement technology by combining a scanning transducer and computer in a single instrument that may be used at a patient's bedside. The patented system produces high resolution color images of up to 14 millimeters of human tissue, generates cross-sectional images of the skin and provides information regarding skin surface and subsurface and features.

The Westminster Supra Scanner has additional applicability in diagnosis of skin cancer and other skin disorders, plastic surgery and diagnosis of lymphatic disorders.